Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently amended) A method of producing a polymer composition comprising incorporating a high molecular weight polymer into a low molecular weight polymer to form the polymer composition in a single polymerization reactor in the presence of polymerizable monomers, a bimetallic catalyst composition and at least one control agent; wherein the control agent is added in an amount sufficient to control the level of incorporation of the high molecular weight polymer, the level of low molecular weight polymer, or both; wherein the control agent is selected from the group consisting of alcohols, ethers, aldehydes, ketones, amines, O_2, carbon monoxide, and mixtures thereof; and wherein the bimetallic catalyst composition comprises a metallocene comprising at least one fluoride ion leaving group.

2. (Currently amended) A method of controlling the I_{21} of a polymer composition comprising forming a high molecular weight polymer and a low molecular weight polymer in a single polymerization reactor in the presence of polymerizable monomers, a bimetallic catalyst composition and at least one control agent; wherein the control agent is added in an amount sufficient to control the level of incorporation of the high molecular weight polymer, the level of low molecular weight polymer, or both; wherein the control agent is selected from the group consisting of alcohols, ethers, aldehydes, ketones, amines, O_2, carbon monoxide, and mixtures thereof; and wherein the bimetallic catalyst composition comprises a metallocene comprising at least one fluoride ion leaving group.

3. (Currently amended) A method of producing a polymer composition comprising contacting a bimetallic catalyst composition, a control agent and polymerizable monomers in a single polymerization reactor; characterized in that the bimetallic catalyst composition comprises a

first catalyst component and a second catalyst component, wherein the first catalyst component is capable of producing a low molecular weight polymer and the second catalyst component is capable of producing a high molecular weight polymer; and wherein the control agent substantially alters the polymerization activity of the first or second catalyst component relative to the second or first catalyst component, respectively; wherein the control agent is selected from the group consisting of alcohols, ethers, aldehydes, ketones, amines, O_2, carbon monoxide, and mixtures thereof; and wherein the bimetallic catalyst composition comprises a metallocene comprising at least one fluoride ion leaving group.

4. (Original) The method of Claim 1, 2 or 3, wherein the control agent is in a nebulous or gaseous state at a temperature of from 50°C to 120°C and a pressure of from 1 to 100 bar.

5. (Original) The method of Claim 1, 2 or 3, wherein the control agent is in a nebulous or gaseous state at a temperature of from 70°C to 100°C and a pressure of from 10 to 80 bar.

6. (Cancelled)

7. (Original) The method of Claim 1, 2 or 3, wherein the control agent is selected from the group consisting of C_1 to C_{10} alcohols, C_2 to C_{16} ethers, C_2 to C_{10} aldehydes, C_3 to C_{16} ketones, C_1 to C_{16} alkylamines, ammonia, O_2, carbon monoxide, and mixtures thereof.

8. (Original) The method of Claim 1, 2 or 3, wherein the control agent is selected from the group consisting of C_1 to C_{10} mono-alcohols and C_2 to C_{10} mono-ethers, oxygen, and combinations thereof.

9. (Original) The method of Claim 1, 2 or 3, wherein water is also added to the polymerization reactor at from 1 wt ppm to 50 wt ppm, based on the primary monomer feed rate.

10. (Original) The method of Claim 1, 2 or 3, wherein the bimetallic catalyst composition comprises an inorganic oxide support and at least two catalyst components selected from the group consisting of metallocenes, Ziegler-Natta catalysts, and metal-amido catalysts.

11. (Original) The method of Claim 1, 2 or 3, wherein the bimetallic catalyst composition comprises an inorganic oxide support, a metallocene, and another catalyst component selected from the group consisting of titanium and magnesium-containing Ziegler-Natta catalysts and metal-amido catalysts.

12. (Original) The method of Claim 1, 2 or 3, wherein the bimetallic catalyst composition comprises an inorganic oxide support, a metallocene, and a titanium and magnesium-containing Ziegler-Natta catalyst; wherein the molar ratio of control agent to titanium of the Ziegler-Natta catalyst ranges from 0.01 to 20.

13. (Original) The method of Claim 1, 2 or 3, wherein the bimetallic catalyst composition comprises an inorganic oxide support, a metallocene, and a titanium and magnesium-containing Ziegler-Natta catalyst; wherein the molar ratio of control agent to titanium of the Ziegler-Natta catalyst ranges from 0.1 to 16.

14. (Cancelled)

15. (Original) The method of Claim 12, wherein the inorganic oxide support is silica having an average particle size of from 50 μm or less and a pore volume of from 0.8 to 5 cm^3/g.

16. (Original) The method of Claim 12, wherein the inorganic oxide support is silica having an average particle size of from 35 μm or less and a pore volume of from 1 to 2 cm^3/g.

17. (Original) The method of Claim 1, 2 or 3, wherein the polymerizable monomers are ethylene and an olefin selected from C_3 to C_{10} α-olefins.

18. (Original) The method of Claim 1, 2 or 3, wherein the polymerization reactor is a continuous, gas phase fluidized bed reactor having a recycle line and operated at from below the melting point of the polymer composition to above 50°C.

19. (Original) The method of Claim 18, wherein the control agent is added to the recycle line of the polymerization reactor.

20. (Original) The method of Claim 1, 2 or 3, wherein ethylene and hydrogen are present in the polymerization reactor, and wherein the ratio of hydrogen to ethylene ranges from 0.002 to 0.024.

21. (Original) The method of Claim 1, 2 or 3, wherein an aluminum alkyl is combined with the catalyst composition in the polymerization reactor.

22. (Original) The method of Claim 1, 2 or 3, wherein the polymer composition is a bimodal polymer composition having a molecular weight distribution (Mw/Mn) of from 2.5 to 150, a molecular weight distribution (Mz/Mw) of from 3 to 10, an I_2 of from 0.01 to 10 g/10 cm, an I_{21} of from 4 to 100 dg/min, and a density in the range of from 0.890 to 0.970 g/cm^3.

23. (Original) The method of Claim 1, 2 or 3, wherein the polymer composition has a dynamic viscosity η at 200°C and 0.1/sec of from 100 kPoise to 3000 kPoise as measured by ASTM D 4440-95.

24. (Original) The method of Claim 1, 2 or 3, wherein the molecular weight distribution (Mw/Mn) of the high molecular weight polymer ranges from 3 to 24.

25. (Original) The method of Claim 1, 2 or 3, wherein the polymer composition has an Mz value of from greater than 800,000 amu.

26. (Original) The method of Claim 1, 2 or 3, wherein the incorporation of high molecular weight polymer decreases from between 60 to 70 wt% by weight of total polymer composition to 30 to 55 wt% by weight of total polymer composition when from 1 to 30 ppm of control agent is added to the polymerization reactor.

27. (Original) The method of Claim 1, 2 or 3, wherein the high molecular weight polymer has a weight average molecular weight ranging from 100,000 to 1,000,000 amu.

28. (Original) The method of Claim 1, 2 or 3, wherein the high molecular weight polymer has a weight average molecular weight ranging from 250,000 to 700,000 amu.

29. (Original) The method of Claim 1, 2 or 3, wherein the low molecular weight polymer has a weight average molecular weight ranging from 5,000 to 100,000 amu.

30. (Original) The method of Claim 1, 2 or 3, wherein the control agent is added in an amount sufficient to increase or decrease the level of incorporation of the high molecular weight polymer by from 1 to 40 wt% based on the total amount of polymer composition, relative to the catalyst activity in the absence of control agent.

31. (Original) The method of Claim 30, wherein the level of the low molecular weight polymer increases or decreases by from 0 to 10 wt% based on the total amount of polymer composition relative to the catalyst activity in the absence of control agent.

32. (Original) The method of Claim 1, 2 or 3, wherein the bimetallic catalyst composition comprises a metallocene and a titanium containing Ziegler-Natta catalyst; wherein the addition of from 0.1 to 30 ppm, based on the feed rate of primary monomer in the polymerization reactor, of control agent decreases the activity of the titanium containing Ziegler-Natta catalyst by from 2 to 80 % relative to the catalyst activity in the absence of control agent; and wherein the activity of the metallocene decreases from 0 to 30 % relative to the catalyst activity in the absence of control agent.

33. (Original) The method of Claim 1, 2 or 3, wherein upon addition of from 0.1 to 50 ppm, based on the feed rate of primary monomer in the polymerization reactor, of control agent, the I_{21} value of the polymer composition increases from 10 to 1000 % relative to the I_{21} value of the polymer composition when control agent is absent.

34. (Original) The method of Claim 1, 2 or 3, wherein upon addition of from 0.1 to 50 ppm, based on the feed rate of primary monomer in the polymerization reactor, of control agent, the I_{21} value of the polymer composition increases from 15 to 100 % relative to the I_{21} value of the polymer composition when control agent is absent.

35. (Original) The method of Claim 1, 2 or 3, wherein the polymer composition is formed into a pipe or film.

36. (Original) The method of Claim 1, 2, or 3, wherein the polymer composition is injection molded, blow molded, roto-molded or formed into a sheet or tubing.

37. (Original) The method of Claim 1, 2 or 3, wherein the bimetallic catalyst composition is introduced into the fluidized bed of a gas phase reactor with monomers and optionally with from 1 to 100 ppm of water to obtain the polymer composition having a I_{21} value A; followed by the introduction of a continuous amount of a control agent ranging from 0.1 to 500 ppm based on the rate of primary monomer introduction to the polymerization reactor, in order to obtain a polymer composition having a I_{21} value of B; wherein A and B differ by more than 2 dg/min or more in I_{21} value.

38. (Original) The method of Claim 1, 2 or 3, wherein the bimetallic catalyst composition is introduced into the fluidized bed of a gas phase reactor with monomers, hydrogen, and optionally with from 1 to 50 ppm of water, to obtain the polymer composition having a I_{21} value A; followed by the introduction of a continuous amount of a control agent ranging from 0.1 to 500 ppm based on the rate of primary monomer introduction to the polymerization reactor, the introduction of control agent being at the recycle line, in order

to obtain a polymer composition having a I_{21} value of B; wherein A and B differ by more than 2 dg/min or more in I_{21} value.

39. (Original) The method of Claim 37, wherein the value of A is lower than the value of B by from 2 dg/min or more in I_{21} value.

40. (Original) The method of Claim 1, 2 or 3, wherein the control agent is present from greater than 1 wt ppm based on the primary monomer feed rate.

41. (Currently amended) A method of producing a polymer composition comprising incorporating a high molecular weight polymer into a low molecular weight polymer to form the polymer composition in a single polymerization reactor in the presence of polymerizable monomers, a bimetallic catalyst composition and at least one control agent; wherein the control agent is added in an amount sufficient to control the level of incorporation of the high molecular weight polymer, the level of low molecular weight polymer, or both; wherein the bimetallic catalyst composition is introduced into the fluidized bed of a gas phase reactor with monomers and optionally with from 1 to 100 ppm of water to obtain the polymer composition having a I_{21} value A; followed by the introduction of a continuous amount of a control agent ranging from 0.1 to 500 ppm based on the rate of primary monomer introduction to the polymerization reactor, in order to obtain a polymer composition having a I_{21} value of B; ~~wherein A and B differ by more than 2 dg/min or more in I_{21} value~~ wherein the value of A is lower than the value of B by from 2 dg/min or more in I_{21} value.

42. (Previously presented) A method of producing a polymer composition comprising incorporating a high molecular weight polymer into a low molecular weight polymer to form the polymer composition in a single polymerization reactor in the presence of polymerizable monomers, a bimetallic catalyst composition and at least one control agent; wherein the control agent is added in an amount sufficient to control the level of incorporation of the high molecular weight polymer, the level of low molecular weight polymer, or both; wherein the bimetallic catalyst composition comprises a metallocene comprising at least one fluoride ion leaving group.